

REMARKS

Claims 1-17 are pending. Claims 1 and 14 have been amended. Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103

A. Claims 1-6 were rejected under 35 U.S.C. § 103(a) over Bernier et al. (U.S. Patent No. 6,069,023) in view of Terpstra et al. (U.S. Patent No. 5,523,049). Claim 1 has been amended to include the subject matter of claim 14. Accordingly, Applicants respectfully submit that this rejection is moot.

Additionally, with respect to the subject matter of original claim 14 which the Examiner alleged was disclosed by Alcoe, Applicants respectfully submit that Alcoe does not teach or suggest the subject matter of amended claim 1. Specifically, Alcoe discloses a collar element 20 with a modulus or elasticity that is the same as the silicon chip 30, not an intermetallic heat spreader that has a modulus of elasticity of at least the modulus of elasticity of the semiconductor die. The collar element 20 in Alcoe are used to support the chip 30 and are not analogous to the intermetallic heat spreader recited in claim 1.

B. Claims 1, 7, and 8 were rejected under 35 U.S.C. § 103(a) over Utagikar et al. (U.S. Patent No. 6,583,513) in view of Terpstra. Applicants respectfully traverse this rejection.

Claim 1 is believed allowable for at least the same reasons presented above and because Utagikar does not remedy the deficiencies of Terpstra and Bernier discussed above. Claims 7 and 8 are believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of their dependence upon claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

C. Claims 9 and 10 were rejected under 35 U.S.C. § 103(a) over Utagikar in view of Terpstra and further in view of the Examiner's remarks. Applicants respectfully traverse this rejection.

Claims 9 and 10 are believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of their dependence upon claim 1 and because the Examiner's remarks do not remedy the deficiencies of Utagikar in view of Terpstra discussed above with respect to claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

D. Claims 11, 12, 16, and 17 were rejected under 35 U.S.C. § 103(a) over Bernier in view of Terpstra and further in view of the Examiner's remarks. Applicants respectfully traverse this rejection.

Claim 16 is believed allowable for at least the reasons presented above with respect to claim 1 since claim 16 recites subject matter that is similar to the subject matter of claim 1 discussed above. Additionally, claim 16 is believed allowable because no combination of Bernier, Terpstra, and the Examiner's comments discloses, teaches, or suggests an intermetallic heat spreader having a coefficient of thermal expansion in the range of about 18 ppm/ $^{\circ}$ C to about 26 ppm/ $^{\circ}$ C. Although the Examiner, relying on *In re Aller*, 105 USPQ 233, alleges that such a range merely involves discovering an optimum working range and involves only routine skill in the art, the Examiner has only cited coefficients of thermal expansion for Cu and Al individually, not a coefficient of thermal expansion for an intermetallic heat spreader. No coefficients of thermal expansion are disclosed in either Bernier or Terpstra. Both references are concerned with thermal conductivity, not with thermal expansion. A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) Therefore, since neither reference is concerned with thermal expansion, the Examiner has incorrectly applied *In re Aller*.

Claims 11, 12, and 17 are believed allowable for at least the same reasons presented above with respect to claims 1 and 16 by virtue of their dependence upon claims 1 and 16. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

E. Claim 13 was rejected under 35 U.S.C. § 103(a) over Bernier in view of Terpstra and further in view of Chen et al. (U.S. Publication No. 2003/0150595).

Claim 13 is believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of its dependence upon claim 1 and because Chen discloses an aluminum alloy and not an intermetallic compound comprising CuAl₃, as recited in claim 13. As discussed in previous response, an alloy and an intermetallic compound are very different compositions. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

F. Claim 14 was rejected under 35 U.S.C. § 103(a) over Bernier in view of Terpstra and further in view of Alcoe et al. (U.S. Patent No. 6,570,259).

Claim 14 is believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of its dependence upon claim 1 and because Alcoe discloses a collar element 20 with a modulus or elasticity that is the same as the silicon chip 30, not an intermetallic heat spreader that has a modulus of elasticity of more than the modulus of elasticity of the semiconductor die, as recited in claim 14. The collar element 20 in Alcoe are used to support the chip 30 and are not analogous to the intermetallic heat spreader recited in claim 14. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

G. Claim 15 was rejected under 35 U.S.C. § 103(a) over Bernier in view of Terpstra and further in view of Shaw et al. (U.S. Patent No. 5,330,701)

Claim 15 is believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of its dependence upon claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

Conclusion

Therefore, all objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Should any issues remain unresolved, the Examiner is encouraged to contact the undersigned attorney for Applicants at the telephone number indicated below in order to expeditiously resolve any remaining issues.

Respectfully submitted,

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Date: April 27, 2006